APPE MC0006

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The Falkirk Ward

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286 EUSTON
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SCOTTISH HOME AND HEALTH DEPARTMENT

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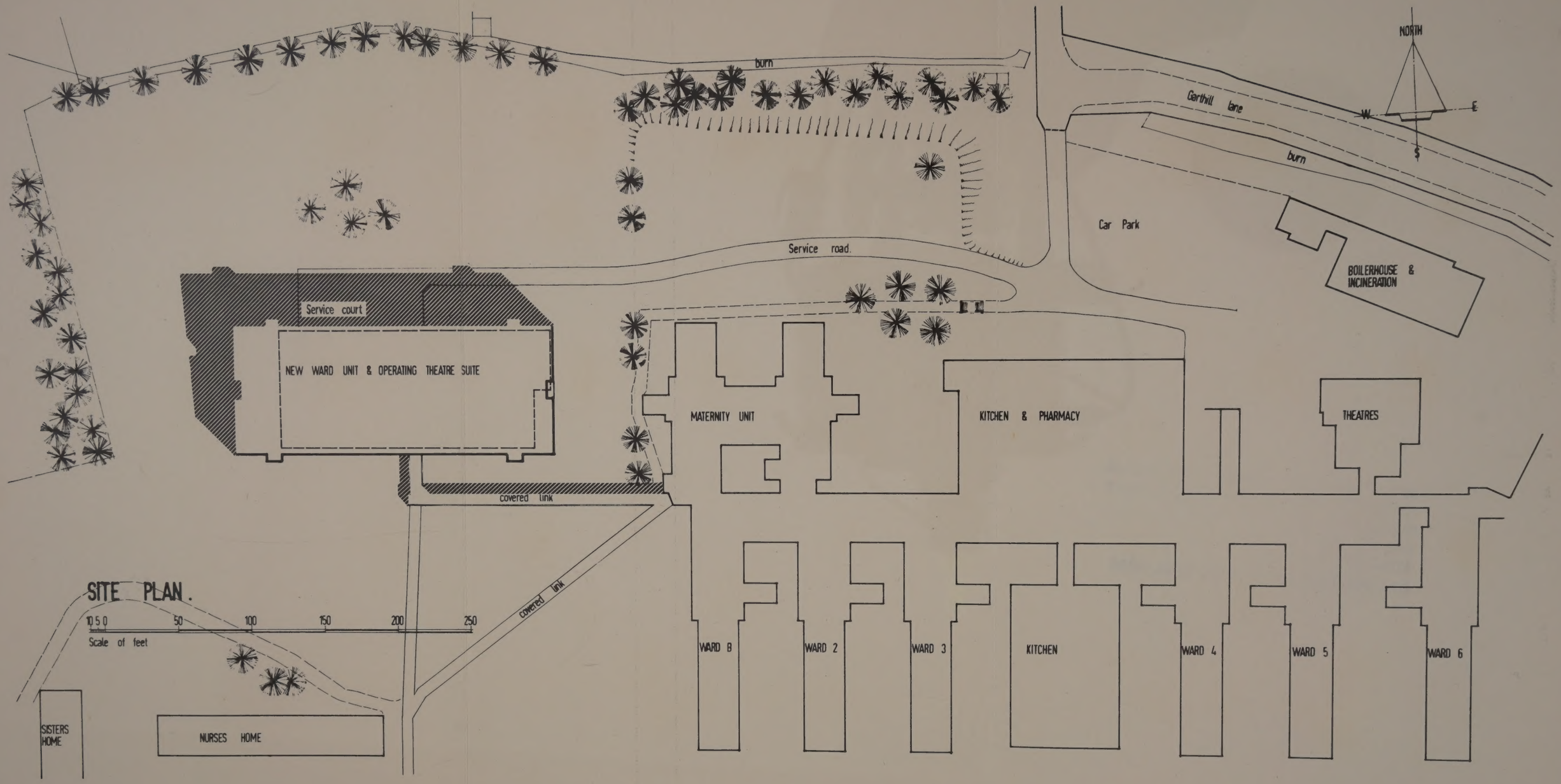
burn
Garthill lane
burn
NORTH
W
E
S
Car Park
BOILERHOUSE & INCINERATION
Service road.
Service court
NEW WARD UNIT & OPERATING THEATRE SUITE
MATERNITY UNIT
KITCHEN & PHARMACY
THEATRES
covered link
covered link
SITE PLAN.
10 5 0 50 100 150 200 250
Scale of feet
WARD 8
WARD 2
WARD 3
KITCHEN
WARD 4
WARD 5
WARD 6
SISTERS HOME
NURSES HOME

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The Falkirk Ward Unit

An Experiment in Design

1. In the supplement to Scottish Home and Health Department Hospital Planning Note 1, "Ward Design" the background to the planning of an experimental ward unit is described. It is explained that the particular layout which has been developed is one way in which the functional requirements detailed in the Planning Note may be met.

2. An underlying but fundamental intention was the attempt to provide privacy, amenity and better facilities for caring for patients and so set standards for National Health Service hospitals which might be generally acceptable for many years to come. This meant a complete departure from the Nightingale Ward; but a move completely to single bed-rooms, or even double bed-rooms (as in the United States) could not be contemplated because of the operational and staffing difficulties, not to mention the increased capital and running costs. A combination was selected, therefore, of 4-bed wards and single rooms. Four beds in a ward were thought to give a significant advantage in privacy and social acceptability compared with any higher numbers. The ward floor was planned for 60 beds of which 12 form an intensive nursing care area. This area can be reduced to 8 or 4 beds with a corresponding increase in the adjacent nursing charges.

3. Several features now contemplated or being proposed for new ward units are as yet untried in this country. The purpose of the experimental ward unit is:

(i) to incorporate new features of ward unit design suitable for a medium sized general hospital; and

(ii) to assess the value of these features in practice.

In other words, it is intended in the first place to have a design experiment and, secondly, an operational trial.

Layout

4. The building consists of a basement mainly containing ventilation and heating plant, four operating theatres at ground level, the ward itself on the first floor, and a further ward on the second floor providing a further 60 beds required for the immediate needs of Falkirk Royal Infirmary.

5. The operating theatre floor is conventional and is not part of the design experiment.

6. The ward floor was planned to simulate a floor in a multi-storey building.

7. The total area of each ward floor excluding communication space is 17,575 sq. ft. The circulation space together with area occupied by partitions etc. represents an addition of approximately 38.5% to the net area of rooms provided. The height of the hung ceiling in wards is 9 ft. 0 ins. and in corridors 8 ft. 0 ins.

Planning Assumptions

8. The principal features on which planning assumptions will be tested in this ward are set out in the following paragraphs:

Deep, Compact Plan Relying on Controlled Mechanical Ventilation

9. Deep plans (including the so-called race-track plan) are not available for study in this country. The opportunity has been taken, therefore, of building a "deep" ward and one of the main experimental aspects will be to test the extent of mechanical ventilation required, its control and cost, its effect or otherwise on patient environment and the adequacy of mechanical ventilation without cooling. A linear design would not have enabled these and some other features to be studied.

High Degree of Privacy and Amenity

10. For social reasons and to contribute towards the control of cross infection, there is a trend towards the greater sub-division of ward units and, in this ward, beds have been grouped either in single-bed rooms or in rooms containing four beds. 20 per cent of the total number of beds are in single rooms. Sub-division makes it imperative to make the ward as easy as possible to work. Close attention has therefore been given in planning to retain satisfactory nursing observation of patients and to minimise the walking distances for nurses. An improved level of amenity in terms of toilet facilities, day spaces and clothing storage has been an important

objective and this is directly related to the requirement of flexibility in use as described briefly at paragraph 14 below. It is an essential part of the experiment, therefore, to study the acceptability of 4-bed wards from the point of view of the patient and of the staff; and to examine whether the proportion of single beds provided (20 per cent) is sufficient for the purposes laid down in the Nuffield Study ('Investigations into the Design and Function of Hospitals').

High Degree of Flexibility in use between different specialties and the two Sexes

11. A customary division of in-patient accommodation into separate wards for men and women (and children) is becoming less appropriate because of the appearance of many sub-specialties, a greater realisation that suitable nursing charges do not always follow the size of a specialty or sub-specialty, the increasingly close links between specialties in the care of individual patients and the need to allow for further developments which are at present uncertain. A rigid sub-division makes it more difficult to utilise beds fully and the design aims to provide accommodation which can be apportioned between specialties, types of patient or the sexes and may be varied from time to time.

Day Lighting

12. Very large glazed areas are disadvantageous in hospitals; there is considerable heat loss in cold weather and heat gain in sunshine. These effects can be uncomfortable for patients and staff and can lead to additional cost. Glare is troublesome and awkward to control. The possibility of artificial lighting taking over imperceptibly from daylighting in the depths of rooms or in the interior of a block such as a ward unit is a matter of some importance in the hospital context. Details of installation and levels of lighting are given in Appendix 'C'.

Incorporation of Planned Accommodation for Intensive Nursing Care

13. In "acute" wards, a proportion of patients for at least part of their stay in hospital make heavy demands on nursing skill, require easy and, in some cases, constant observation and nursing attention which continue without intermission both by day and by night. Skilled nursing effort and the necessary equipment and apparatus may be made available more economically and more efficiently if such patients are grouped in specially planned accommodation on a large ward floor. In this ward unit, provision has been made for a self-contained intensive nursing care area serving the beds from two nursing charges but under the overall care of an administrative sister. Since the demand for this accommodation remains uncertain, the unit has been designed to be flexible in size.

Nursing Charge

14. The normal nursing charge of 25 to 30 beds grouped separately is too small to support a viable intensive nursing care unit. Moreover the sister's responsibility for her patients, for nurse training, and the managerial tasks of deploying staff and resources to ensure the adequacy of all the services which impinge on the ward constitute a heavy burden which the normal nurse-staffing pattern does little to relieve. It seems feasible, however, to group 60 (or more) beds to form a single charge for an administrative sister responsible for the deployment of all the nursing staff in that group; this might include two, or even three sisters (depending upon the specialty) who would still be responsible for the care of the patients within their unit but who would be relieved of many managerial responsibilities and the organisation of nurse training. 60 beds also appeared to be a reasonable size of ward floor to support its own intensive nursing care unit.

Arrangement of Rooms and Equipment to Facilitate Work of Nurses

15. Nursing journeys are increased by the sub-division of wards and the work load is affected by the need to maintain high bed occupancy ratios with relatively short durations of stay in acute wards. The modern ward must, therefore, be designed to minimise so far as possible the extra burden to be carried by nurses. This means that more attention than ever is necessary to planning the relationship of ancillary rooms to each other and to the bed areas which they serve.

16. In planning this ward it has been recognised that the basic nursing cycle may be regarded as:

receive or read instructions,
prepare the items necessary to carry out a procedure or treatment,
carry out the procedure or treatment,
dispose of the items used (including the returning of cleaned equipment e.g. the trolley, to the preparation room),
make the necessary record.

17. The ancillary rooms required are, basically, somewhere to read or otherwise receive instructions and to record the results, a room in which to prepare the items required and a room in which to dispose of items either for destruction, sterilisation, or for the laundry. There are preparation and disposal functions which are incompatible with the others and need separate rooms — a pantry function (e.g. the preparation of beverages) and the sluice room function.

18. The working ancillary rooms required, therefore, are:

the nurses' station,
a preparation room,

a kitchenette or pantry,
a disposal room,
a sluice room.

These are the rooms from which the nursing service is extended to the patients wherever they may be within the nursing unit; these rooms are also used in sequence in the circuit of nursing work. They must therefore form a suitably integrated group at the focal point of the patient care areas.

Self-Contained Toilet and Washing Accommodation

19. Early ambulation offers greater opportunity for patients to use toilet and washing accommodation. To facilitate this and to make feasible the use of an adjoining room by the opposite sex, it is desirable that each four-bed room and each single room should have its own W.C., wash-hand basin and shower accessible without having to cross a corridor. These facilities have been incorporated in this ward unit except for the single-bed cubicles in the intensive nursing care area.

Day Spaces

20. Early and partial ambulation makes it desirable for a proportion of patients to be able to sit and have meals near their beds rather than in a central day space. This has been apparent in recent ward studies. The provision of an element of day space in each four-bed room will meet this requirement and facilitate flexibility in the use of adjacent rooms. Some centralised day space for patients at a later stage in convalescence and where more noisy pursuits may be indulged, e.g. watching television, has also been provided in the form of relatively small spaces of a more domestic character than has been evident in recent ward planning.

Duty Stations

21. To facilitate the work of the sister, the nurses, and the house officer, the duty stations have been placed in close association. The sister and the house officer have been provided with small "office" type spaces in front of which is a simple nurses' station. The effectiveness of this grouping will be carefully studied when the ward unit is brought into use. It has been assumed that the presence of an administrative sister at the ward floor level will relieve the sisters of a considerable amount of clerical work and managerial functions vis a vis the rest of the hospital — the supply and other services, and the provision of some accommodation for the house officer in this group of facilities is to ensure that the medical records can be handled conveniently at a central point in each sister's charge.

Treatment Room

22. This room is regarded as a special bed area, but a bed area which

need occupy no more special relationship to preparation and disposal rooms than any other bed area (see arguments in Hospital Planning Note 1). It has been considered inadvisable to plan it en suite with the preparation and disposal rooms. Its use will be elective and it has been located on this basis.

Bathrooms

23. One bathroom with a free-standing bath has been planned in each sister's charge of 24/28 beds. It has been a planning assumption that greater reliance should be placed on showers which appear to be increasingly acceptable to patients and which are more easily kept clean.

Interview/Overnight Stay Room

24. A room for these purposes has been incorporated in the design and this may help to clarify the need for accommodation of this kind in acute general wards.

Operational Features

25. The main operational features to be evaluated include:

(i) Experience gained from having an administrative sister based at ward level;

(ii) The extent to which the size of a nursing charge is affected by:
- (a) selective patient grouping
- (b) the more efficient organisation of supporting services;

(iii) The influence of layout and proposed nursing administration on:
- (a) the approach to patient care
- (b) nursing routines and the organisation of nursing work
- (c) training requirements;

(iv) The intensive nursing care area:
- (a) its size in relation to the size of the ward floor
- (b) functional integration with the adjacent nursing charges and the responsibility for the movement of patients between the different nursing areas;

(v) The importance of planning for flexibility in use and its contribution to high bed occupancy;

(vi) Use of various grades of nurse in teams; the possible introduction of a three shift system;

(vii) Internal rotation of nursing staff, including night duty;

(viii) Use of the duty stations:
- (a) by day
- (b) by night;

(ix) Use of single rooms;

(x) Amount of clinical teaching of nurses that may be facilitated;
(xi) Use of the bathing, shower, washing and toilet facilities and their acceptability to patients;
(xii) Use of the various day areas and any effect in easing the transition from being bed-fast to ambulant;
(xiii) Amount of observation and conversely, when required, privacy which this layout allows;
(xiv) Effectiveness of the patient-call system;
(xv) Use made of the treatment room, and effect of separation from preparation and disposal rooms;
(xvi) Effectiveness of replacing certain working-tops by trolleys (in preparation room);
(xvii) Use of sani-chairs;
(xviii) Value of locating patients' clothes lockers within the bed-curtain area;
(xix) Effectiveness of bed-curtains fixed at ceiling height and including a strip of netting material;
(xx) Effect on staff of working in internal rooms;
(xxi) Use of the interview/overnight stay accommodation;
(xxii) Contribution which this layout may make towards the control of cross infection;
(xxiii) Efficiency with which the procedure for the admission of patients can be carried out in the absence of an admission room;
(xxiv) Possible use of monitoring facilities in the intensive nursing care area (facilities for future provision have been included);
(xxv) Degree to which noise control has been achieved;
(xxvi) Use of beds for the transport of patients (ease of getting in and out of rooms, etc.);
(xxvii) Acceptability of the heating, lighting and ventilating arrangements to patients and staff;
(xxviii) Effect of this degree of ward sub-division on:
  (a) early morning routine (letting some patients sleep on)
  (b) visiting hours (less restricted visiting);
(xxix) Integration with central services (linen, meals, dish-washing);
(xxx) Concept of storing of clean and sterile equipment (including linen) in the preparation room;
(xxxi) Level of staffing which proves necessary — in different grades;
(xxxii) Influence of this layout on domestic services.

Programme of Planning and Construction

(i)	1961	Working Party of Hospital Planning Committee decided after many discussions that the rectangular design was more suitable than the triangular design.
(ii)	1962 April	Draft Schedule of Accommodation.
(iii)	June	60-bed unit more economical than 48-bed ward.
(iv)	October	Sketch plans (revised) submitted.
(v)	November	Provisional estimated cost submitted.
(vi)	December	Revised estimated cost agreed.
(vii)	1963 August	Lowest tender accepted.
(viii)		Site works begun.
(ix)	1964 June	Approval given to additional ward floor. 120 beds now being provided.
(x)	1966	Completion.

Construction and Materials

Structure

1. While the ward has been planned as a floor in a multi-storey ward block, an early decision was made, mainly on cost grounds, not to simulate multi-storey *construction* but to design the structure simply for the single ward floor elevated to first floor level.

2. The frame is reinforced concrete. The structural grid of 22′ 0″ was chosen mainly because of the planning in mind and also because it lends itself to a simple plate construction, that is the use of flat slabs without beams. The absence of beams in the first floor ward reduces the extent of shuttering, adds speed of construction and provides maximum freedom for the installation of ducts, service pipes and cables.

External Walls

3. The main facing material is dark brown facing brick of the unusual size of 14 ins. long by 2 ins. deep. The brickwork is relieved at ground floor level by the use of clay facing tiles. Copper is used to face the eaves fascia and the projecting window bays of the day spaces. To reduce heat loss the inner skin is constructed of blocks of high thermal insulation value.

Roof

4. The roof is metal decking insulated by 2 inches of cork and covered with 3-ply felt.

Windows

5. To reduce solar heat gain the size of the windows was kept to a minimum consistent with adequate daylight. The daylight factor on the inner beds in the 4-bed rooms is 1.5. The windows are constructed in laminated red pine and are double glazed with two layers of $\frac{1}{4}$ in. plate glass. To reduce glare and solar gain a number of windows are fitted with venetian blinds between the two sheets of glass.

Partitions

6. Partitions are of metal framing at 2 ft. 0 in. centres covered with two layers of $\frac{3}{8}$ in. plasterboard on each side, with a glass wool quilt in the cavity. The joints between the plasterboard sheets are dry filled so as to be invisible when painted.

Floor Finishes

7. On the two ward floors vinyl covering with welded joints is used throughout. The operating theatre floors have been finished with antistatic vinyl tiles.

Glazed Link Corridor

8. The covered way from the existing hospital is constructed of mild steel tubular frame, with a timber roof finished on the underside with Parana pine. The sides of the corridor are glazed full height with aluminium patent glazing.

Engineering Services

The following engineering features are included:

Heating

1. For the purpose of comparing two forms of heating particularly in association with mechanical ventilation, the greater part of the ward areas are heated by a proprietary suspended hot water heated ceiling. The remaining ward areas are heated by means of flush radiant panels below sill level. The heating surfaces will provide the basic heating load and control of room temperatures will be by means of varying the air temperature.

Ventilation

2. During the winter months the bed areas will be mechanically ventilated with an air change rate of from three to five per hour. The associated toilets are provided with mechanical extraction. In the warmer weather this rate of air change can be increased up to approximately 8 to 10 air changes. The windows which are double glazed and contain venetian blinds in the inter space will remain closed except under extreme summer conditions. These windows have a positive opening control system.

3. In the core rooms where the heat loss is negligible no heating surface is provided, ventilation rates will be generally higher than in the perimeter bed areas to offset heat gains from lighting equipment and personnel and will aim at providing positive direction of air movement varying from extract only in sluice, disposal, etc., to a choice of positive or negative pressures in the treatment rooms. This facility of providing negative or positive pressures for patients either infectious to others or at risk of infection is also provided in the intensive care rooms and also the four corner single rooms.

Lighting

4. General lighting is mainly by fluorescent fitting. Lighting in the core rooms will be entirely by artificial means. Because of this and for the purpose of more nearly matching daylight hours intensities of light in the bed areas, two levels of general lighting are provided in the core rooms and corridors. These levels of intensity are automatically changed from approximately 25 to 30 lumens per sq. ft. during daylight hours to approximately 15 during evening hours, i.e., when artificial lighting is in use in the bed areas. A third level of lighting is provided for night time conditions, the level of intensity of which will allow staff sufficient light to move around without the patients being disturbed.

Nurse Call Indication

5. A system of indicator lights is provided in such a way that nursing staff may be directed from any point in the ward corridors to the particular patient calling. This is in place of the more usual single indicator board at the nurses' station.

Special Equipment

Bed

1. The bed used throughout the ward unit accords with the basic policy underlying the ward planning note, that patients in a general surgical ward should be "handled" as little as possible. In this unit the patient will remain in the same bed from admission to discharge, whether he is in the general ward areas or the intensive care section and, where necessary, the bed will be used to transport him from one area to another.

2. The bed must therefore have a high degree of mobility and must be capable of height adjustment to facilitate treatment at a suitable level or, where appropriate, to make it easier for the convalescing patient to get in and out of bed.

3. A simple mechanical system of height adjustment was preferred on grounds of maintenance and ease of staff training as well as cost.

4. The bed selected incorporates a removable head-end; bed-stripper; provision for attachment of sides, frames, drip-stand, etc.; solid mattress platform (except for a section at the foot for access to lifting mechanism); and a new adaptation of backrest which minimises the need for the patient to be moved towards the head-end.

Cubicle Rail and Curtaining

5. It was proposed that the traditional method of fitting cubicle rails, i.e. by vertical or cantilever suspension, should not be used. It was considered that the opportunity of a lower ceiling should be taken to depart from the standard method which, while functional, is frequently unsightly and may serve as a dust collector.

6. It was agreed that the method which could be adopted with advantage was to have the rail fitted hard to the ceiling. It was decided, in order to remove any unpleasantness and provide air and light to the patient, that the top 18 inches of the curtain would be of a white nylon mesh permanently fixed to standard curtaining. This new method had, after extensive field trials, proved acceptable.

Estimated Nurse Staffing

3 Shift System

(a) **Ward Unit** — 60 beds.

A and B — 2 Intermediate Care Units of 24 beds
C — 1 Intensive Care Unit of 12 beds } 60 beds

3 *Shifts*	*1st*	*2nd*	*3rd*		
Units A and B	6	6	5	=	17
,, C	4	4	3	=	11
	10	10	8	=	28

Basic Staff: = { 1 Departmental Sister
2 Ward Sisters
28 Nurses

Extra Staff necessary for:

(i) 7 days per week
(ii) Holidays and study blocks
(iii) Sickness
(iv) Extra Nursing demands

TOTAL STAFF = Basic x 1.8 = 28 x 1.8 = 50

(b) **Staffing Grades:**

Basic Staff:	*Units A and B*	*Intensive Care Unit*
Shift 1 —	2 Staff Nurses	2 Staff Nurses
	2 Student or Pupil Nurses	2 Student Nurses
	2 Auxiliary Nurses	
Shift 2 —	2 Staff Nurses	1 Staff Nurse
	2 Student or Pupil Nurses	3 Student Nurses
	2 Auxiliary Nurses	
Shift 3 —	1 Staff Nurse	1 Staff Nurse
	2 Student or Pupil Nurses	2 Student Nurses
	2 Auxiliary Nurses	

(c) **Total Basic Staff:**

9 Staff Nurses
13 Student or Pupil Nurses
6 Auxiliary Nurses

(d) **Total Extra Staff:**

3 Staff Nurses
10 Student or Pupil Nurses
9 Auxiliary Nurses

(e) **TOTAL STAFF:**

12 Staff Nurses	1 Departmental Sister
23 Student or Pupil Nurses	2 Ward Sisters
15 Auxiliary Nurses	
50	3

Costs

		£
(i)	Estimated cost of 60-bed ward floor based on cost plan (exclusive of external works)	154,200
(ii)	Tender cost of above based on bills of quantities for both building works and services	146,058
(iii)	Estimated cost of two ward floors (120 beds in all) based on tenders for above	273,600
(iv)	Comparative cost of 120 beds based on Building Note 17 for race-track wards	277,024

Note

The amounts shown in (i) to (iv) above include a proportion of the structural costs of the building together with the cost of communication spaces, staircases, lifts and a share of mechanical and electrical plant.

Costs were favourably influenced by keen competitive tendering.

The gross area per bed, including circulation but excluding communication space, stairs and lifts, is approximately 12 ft. greater than that represented by Building Note 17. Excluding circulation the net area per bed exceeds that in Building Note 17 by approximately 22 ft. Economical planning involving a lower circulation allowance thus reduced the excess area per bed by 10 ft.

Organisations associated with the project

Scottish Home and Health Department
Western Regional Hospital Board
Board of Management for Falkirk and District Hospitals.

Architects:	Keppie Henderson and Partners 21 Woodside Place Glasgow C.3 in conjunction with Scottish Home and Health Department and Western Regional Hospital Board.
Structural Engineers:	Chas. Weiss and Partners 123 King Street Hammersmith London W.6.
Electrical and Mechanical Engineers:	Western Regional Hospital Board.
Quantity Surveyors:	Jas. D. Gibson and Simpson 3 Melville Crescent Edinburgh 3.
Clerk of Works:	D. McFarlane Western Regional Hospital Board.
Main Contractor:	Jas. Laidlaw & Sons Ltd. Clydesdale Works Dalmarnock Bridge Rutherglen Glasgow.
Sub-Contractors	
Heating and Ventilating:	G. N. Haden & Sons, Ltd. 26 India Street Glasgow C.2.
Electrical:	Jas. Kilpatrick & Son Ltd. Kelvin House River Cart Walk Paisley Renfrewshire.
Plumber Work:	Robert Rome & Son Ltd. 18-20 Woodside Avenue Rutherglen Glasgow.
Plaster Work:	D. Robertson & Son Ltd. 37 Herbertshire Street Denny.
Tile and Terrazzo Work:	Diack & Morton Ltd. 30 Abercorn Street Paisley.

Glazier Work:	Daniel O'May Ltd. West End Falkirk.
Ashphalt and Bituminous Felt Work:	The Ruberoid Co. Ltd. 4 Royal Terrace Glasgow C.3.
Plasterboard Partitions:	The Expanded Metal Co. Ltd. 339 Balmore Road Glasgow N.2.
Smith Work:	J. & G. Malcolm "The Hedges" Camelon Falkirk.
Heated Ceilings:	Frenger Ceilings Ltd. 60 Lorne Street Edinburgh 6.
Suspended Ceilings:	Wm. Beardmore & Co. Ltd. Parkhead Forge Glasgow E.1.
Flooring:	Limmer & Trinidad Co. Ltd. 4 Woodside Place Glasgow C.3.
Ventilating Ducting:	Sun Ventilating Co. Ltd. 206 Springfield Road Glasgow S.E.
Insulation:	Kitsons Insulating Ltd. 490 Dobies Loan Glasgow C.4.
Medical Gases:	British Oxygen Co. Ltd. Rosehill Works Polmadie Glasgow S.2.
Medical Equipment Sub-Contractors:	Sierex Ltd. 22 Oswald Street Glasgow C.1.
	Chas. F. Thackray Ltd. 1 Queen Margaret Road Glasgow W.2.
Patent Glazing:	Pennycook Patent Glazing Engineering Co. Ltd. St. Munro Works Bishopbriggs.

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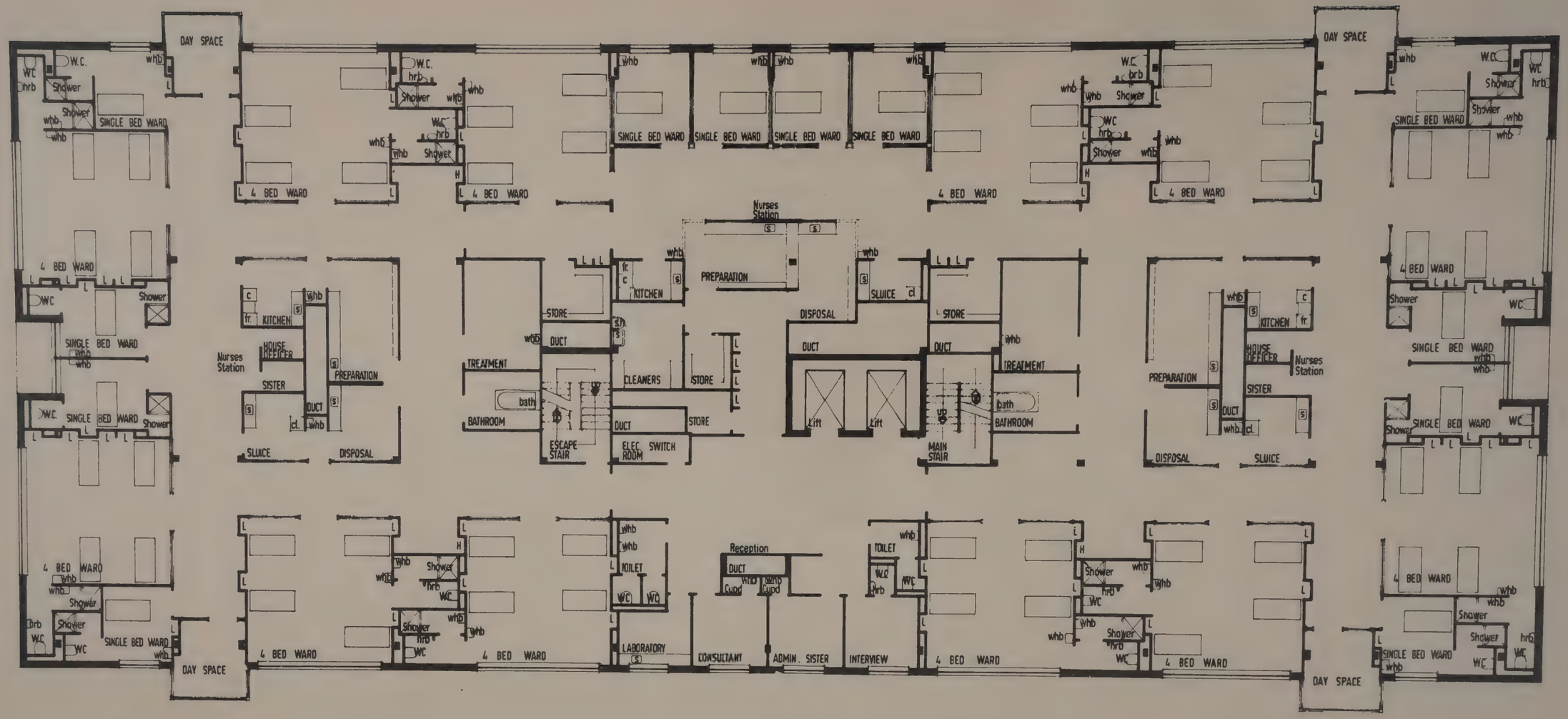
LEGEND :-

whb - wash hand basin.
hrb - hand rinse bowl.
c - cooker.
s - sink.
fr. - fridge.
cl. - clinimatic disposal unit.
s.h. - slop hopper
H - hose reel.
L - patients locker



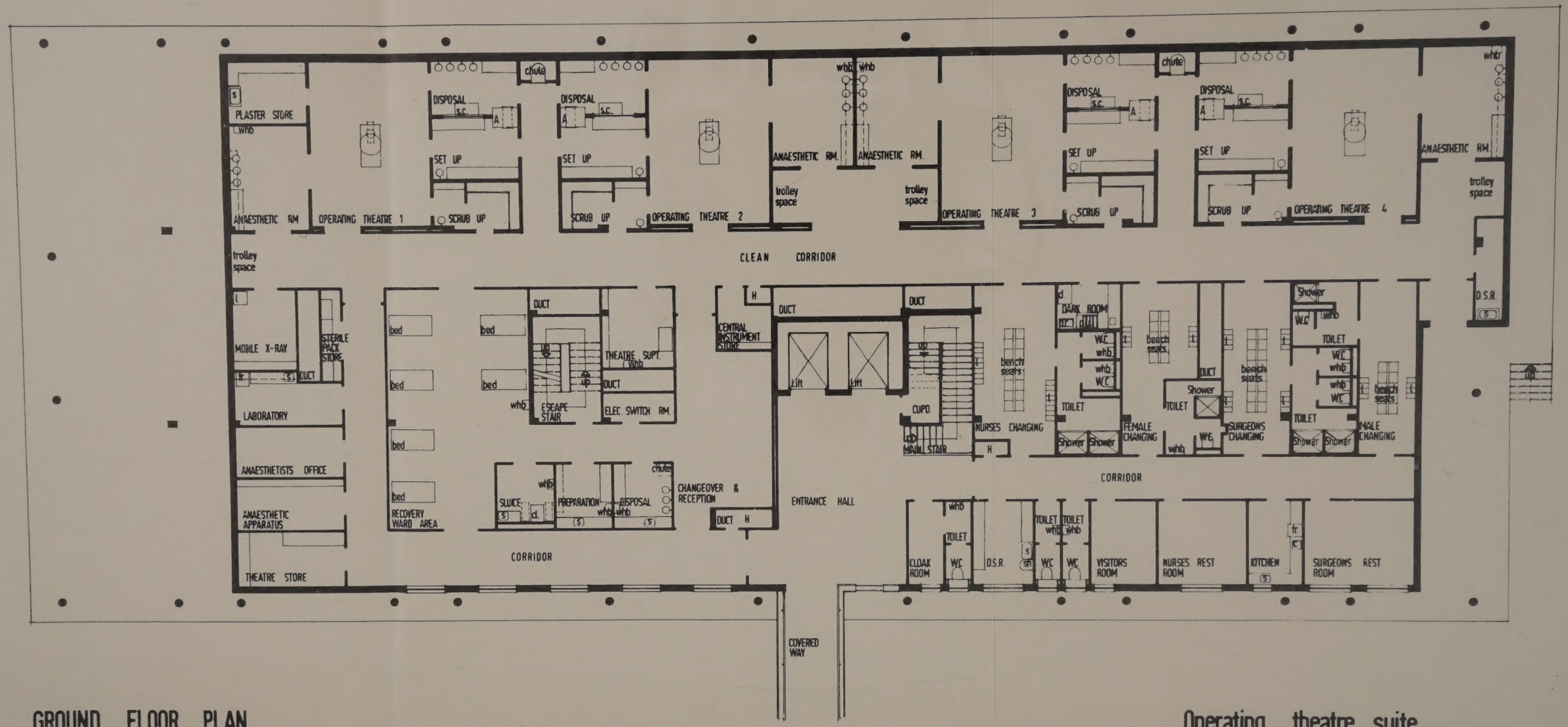
1st & 2nd FLOOR PLANS.

10 5 0 10 20 30 40 50
Scale of feet

New ward unit . . .

LEGEND :-

whb - wash hand basin
s - sink
fr - fridge.
s.c - soni cleaner
A - autoclave
sh - slop hopper
l - locker
cl. - clinimatic disposal unit.
dr - draining rack
pu - processing unit
d - dryer (bench type)
H - hose reel



GROUND FLOOR PLAN.

10 5 0 10 20 30 40 50
Scale of feet

Operating theatre suite . . .